Plasma Master

Plasma-Master

Advanced equipment and technologies for PTA-surfacing

Plasma-Master Co., Ltd.

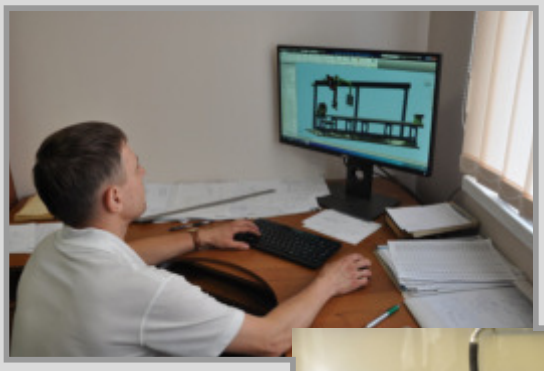
Plasma-Master Co., Ltd. was founded in 1992 by specialists in the field of welding and surfacing. Now Plasma-Master Co., Ltd. is one of the leading manufacturers of plasma transferred arc (PTA) equipment in the world. Our company unites scientists and engineers from the Paton Electric Welding Institute with a rich experience of scientific investigation and industrial developments. Plasma-Master Co., Ltd. has own production facilities equipped with a modern surfacing, welding and mechanical equipment, which, combined with our rich experience allows to solve various technical tasks in the shortest possible time.

The main our activities are:

- Development and application of new technological processes of PTA-surfacing
- Development and manufacturing of PTA equipment
- Development of plasma torches for PTA-process
- Reconditioning and repair of machine parts by welding and surfacing using own production facilities
- Rendering of consultation services on selection of technologies and materials for welding production

Our team consists of:

- Developers
- CAD designers
- Programmers
- Engineers-technologists
- Project managers
- Welders
- Lathe and milling machine operators
- Metalworkers
- Service engineers
- Sales managers



85% of our PTA equipment is exported to 28 countries all over the world

Where **Plasma-Master's** PTA equipment works

Plasma transferred arc (PTA) surfacing is a welding process at which a plasma arc is a heat source and fine-grained powder alloys are used as a consumable.

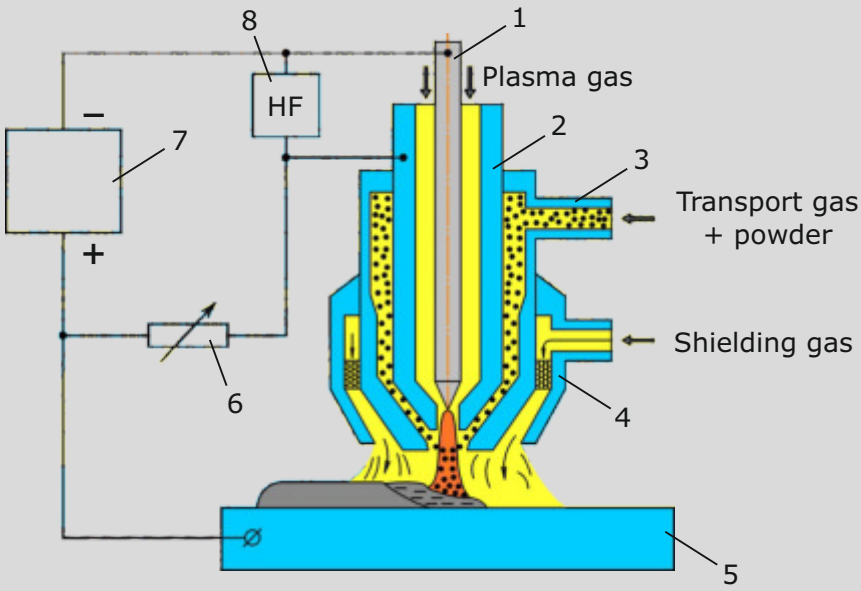
Surfacing is carried out by the high temperature constricted arc, formed by the PTA torch with nonconsumable tungsten electrode. As a powder the wear-resistant, corrosion-resistant and other alloys on Fe-, Ni-, Co- and Cu-base are used.

Powder is fed to an arc zone by transport gas from a powder feeder. Pure argon (99,995% Ar) is used as a working gas.

The main features of PTA-process:

- high deposition rate (up to 10 kg/h)
- high quality of deposited metal
- minimum penetration into base metal (≤ 5%)
- thickness 0,5-5,0 mm and width 3,0-50,0 mm can be deposited by a single pass.

PTA method schematic illustration



1 - Tungsten electrode
2 - Plasma nozzle
3 - Focusing nozzle
4 - Shielding nozzle
5 - Work piece
6 - Ballast resistance
7 - Power source
8 - Ignition unit

For a pilot and a transferred arcs we use the same power source. The pilot arc is used only for ignition the transferred arc and during surfacing process it doesn't work.

PM-150M
manual PTA system

PM-300M
PTA system for universal use

PM-302
universal automated PTA system

We develop and produce a wide range of PTA systems for manual, semi-automated and automated surfacing according to customer's requirements

PM-304
PTA system for automated surfacing engine valves

PM-307
universal PTA system for surfacing mainly long-length parts
L_{max} = 4500 mm

Our PTA torches are designed on the basis of deep experimental investigations of plasma arc energy characteristics, process of heating and melting of the powder in plasma arc and welding pool, and also thermal-physical features of the base metal.

Today we can offer our customers twenty models of PTA torches, which provide almost all possible industrial applications. Most of our PTA torches have an internal distributed powder feeding system that provides high efficiency of heating a powder and therefore its minimal losses.

PTA torches for outside surfacing

PP-6-01
high-productive torch
Imax = 350 A

PP-6-02
high-productive torch
with double inner
powder feeding system
Imax = 350 A

PP-6-04
high-productive torch
with inner and outer
powder feeding systems
Imax = 350 A

PP-7
compact torch
Imax = 150 A

PP-8
medium-productive torch
Imax = 250 A

PP-9S
vertical
compact torch
Imax = 150 A

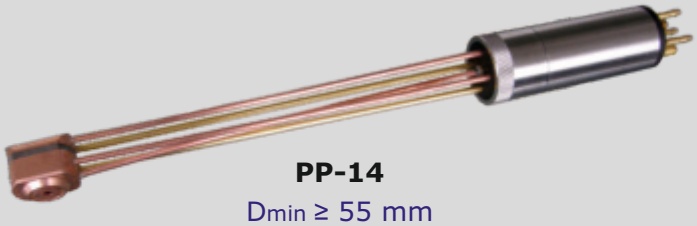
Technical data of PTA torches

Parameters	PP-6-01	PP-6-02	PP-6-04	PP-7	PP-8	PP-9S
Current of pilot arc, A	30-50	30-50	30-50	15-30	30-50	15-30
Current of transferred arc, A (at 100% DC)	30-350	50-350	50-350	20-150	30-250	20-150
Additive powder deposition rate, kg/h	0,5-8,0	1,0-8,0	1,0-8,0	0,4-2,0	0,5-6,0	0,4-2,0
Powder particle size, mkm	63-200	80-250	63-200	63-150	63-200	63-150
Powder losses, %	<5	<5	<5	<5	<5	<5
Total gas flow rate (argon), l/min	12-19	19-22	11-17	10-11	12-16	10-11
Cooling water flow rate, l/min	>4	>4	>4	>2	>4	>2
Diameter × height, mm	60×238	60×260	58×263	32×224	50×240	34×150
Weight, kg	2,2	2,7	2,7	0,8	1,7	0,6

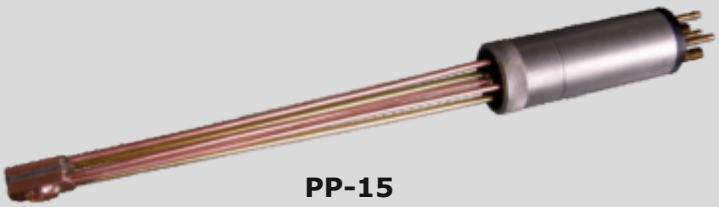
PTA torches for inside and outside surfacing

PP-6-03
Dmin ≥ 130 mm
Imax = 350 A

PP-12
Dmin ≥ 90 mm
Imax = 200 A



PP-14
Dmin ≥ 55 mm
Imax = 200 A



PP-15
Dmin ≥ 45 mm
Imax = 150 A

Technical data of PTA torches

Parameters	PP-6-03	PP-12	PP-14	PP-15
Current of pilot arc, A	30-50	25-50	20-30	20-30
Current of transferred arc, A (at 100% DC)	30-350	30-200	30-200	20-150
Additive powder deposition rate, kg/h	0,5-8,0	0,5-5,0	0,5-3,0	0,5-2,0
Powder particle size, mkm	63-200	63-200	63-160	63-150
Powder losses, %	<5	<5	<6	<8
Total gas flow rate (argon), l/min	13-18	12-17	13-15	11-13
Cooling water flow rate, l/min	>4	>4	>4	>4
Diameter × height, mm	60×114	53×70	46×40	25×25
Weight, kg	2,5	2,2	1,2	1,1

PTA torches for special purpose

PP-9L
vertical torch for surfacing
in deep places
Imax = 130 A

PP-12-01
for inside and outside
surfacing Cu-based alloys
at reversed polarity
Dmin ≥ 90 mm
Imax = 200 A

PP-21
flat torch for surfacing
in hard-to-reach places
Imax = 150 A

PP-25
for manual surfacing
Imax = 150 A

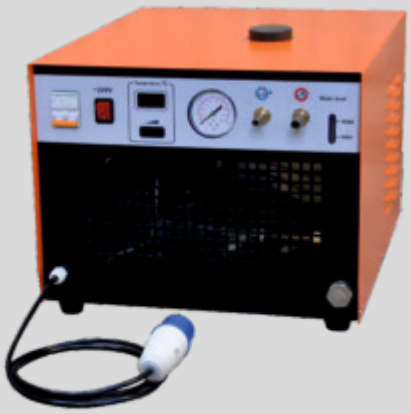
Technical data of PTA torches

Parameters	PP-9L	PP-12-01	PP-21	PP-25
Current of pilot arc, A	15-30	25-50	20-30	20-30
Current of transferred arc, A (at 100% DC)	20-130	30-200	20-150	20-150
Additive powder deposition rate, kg/h	0,4-2,0	0,5-4,0	0,3-2,0	0,5-2,0
Powder particle size, mkm	63-150	63-200	63-150	63-150
Powder losses, %	<5	<5	<6	<5
Total gas flow rate (argon), l/min	10-11	14-19	11-14	12-14
Cooling water flow rate, l/min	>2	>6	>4	>2
Diameter × height, mm	26×320	53×70	16×71	36×90
Weight, kg	0,9	2,2	0,7	0,6

Welding oscillator
PM-WMO-120

Powder feeder
PM-PF-10

Rotator-manipulator
PM-RM-100

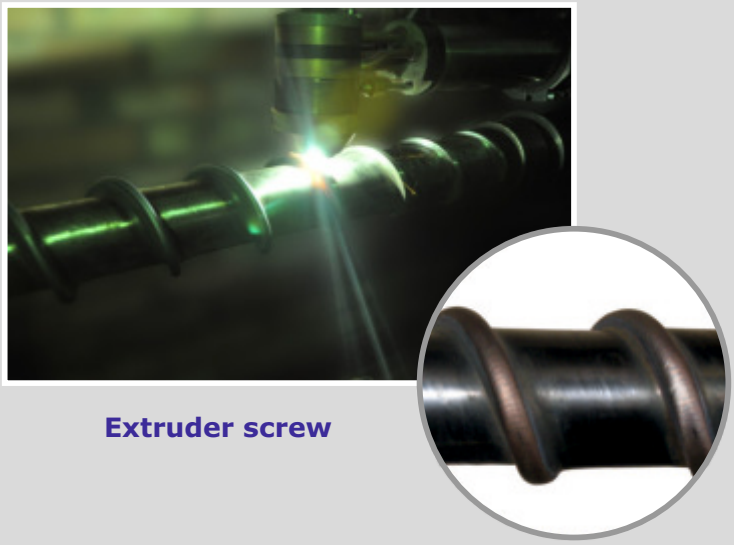


Water chiller
PM-WC-1000
for cooling low-loaded torches
Imax = 150 A

Water chiller
PM-WC-3000
for cooling high-loaded torches
Imax = 300 A

Typical applications of the PTA technology:

- extruder screws
- engine valves
- energy and oil stop valves
- glass moulds
- different bushes
- knives
- shafts
- pump plungers



Extruder screw

Valves

Rolls

Glass mould

Neck rings

Shaft

Small stop valve

Stop valve

Pump parts

Drilling bit legs

Drilling bit rolling cutters

Crusher teeth

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